

Saff-Chol Juice: Your Healthy Drink

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ABSTRACT

Atherosclerosis has been established to be an indolent inflammatory disease of the arteries which can give rise to coronary artery disease (CAD), one of the most prevalent causes of death in developed and developing countries. Saffron, one of the world's most expensive spices, is collected from dried stigmas of *Crocus sativus L.* Saffron exhibits favourable effects in the prevention or treatment of a variety of diseases including dyslipidemia, hypertension and diabetes mellitus. Our previous in-vitro work showed that Saffron downregulates gene and protein expressions of inflammation, endothelial activation and upregulate the gene of oxidative stress and inhibit monocyte- endothelial interactions which are the key events in pathogenesis of atherosclerosis. Thus, we have translated our research finding into saffron formulated drink; Saff-Chol Juice. It can be used as daily healthy drink to combat many atherosclerosis complications such as heart attack, stroke and renal failure. It is safe and easy to consume. This product may benefit patients with heart problem, hypertension and renal failure. It is also useful for smokers who is at risk to develop atherosclerosis.

KEYWORDS: Saffron, *Crocus sativus L.*, Formulated drink, Atherosclerosis, Dyslipidemia

1 INTRODUCTION

Cardiovascular diseases (CVDs) which include coronary heart disease are important component in non-communicable diseases (NCDs) which are the world's biggest killers. An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths [1]. In Malaysia, the population-based health survey which is known as the National Health and Morbidity Survey (NHMS) in 2015 showed that the prevalence of NCD risk factors

continue to rise. It is estimated that 3.5 million adult Malaysians living with diabetes, 6.1 million with hypertension, 9.6 million with hypercholesterolemia and 3.3 million with obesity [2]. The rapid increase in the number of people suffering from NCDs presents one of the biggest challenges to the current healthcare system in Malaysia. Therefore, research in recent years has sparked great interest among researchers towards prevention and treatment of atherosclerosis which is one of the main cause of CVDs. Atherosclerosis has been established to be an indolent inflammatory disease of the arteries which can give rise to coronary artery disease, one of the most prevalent causes of death worldwide. Statin, a HMG-coA reductase inhibitor has favorable pleiotropic effects on atherosclerosis. Though they have confirmed safety and efficacy profile, statins have been reported in epidemiologic and observational studies in which 15% to 20% of all patients on statin might suffer from different statin-associated adverse effects (SAAE) [3].

Saffron, the dried stigmas of *Crocus sativus* L. have been shown to exhibit favourable effects in the prevention and treatment of a variety of diseases such as dyslipidemia, atherosclerosis and myocardial ischemia [4]. Our previous in-vitro work showed that Saffron downregulates gene and protein expressions of inflammation, endothelial activation and upregulate the gene of oxidative stress and inhibit monocyte-endothelial interactions which are the key events in pathogenesis of atherosclerosis [5]. Thus, saffron has potential to be promising anti-atherosclerosis agent. Therefore, we formulated saffron drink; “Saff-Chol Juice” which has proven in in vitro study in attenuating atherosclerosis.

2 OBJECTIVE

To translate our research findings into saffron formulated drink, Saff-Chol Juice.

3 SIGNIFICANCE (S)

It is useful for patients with statin intolerance which develop side effects following statin administration. It can be used as daily healthy drink to reduce atherosclerosis complications, such as heart attack, stroke and renal failure. Therefore, hospital admission, mortality and morbidity rate, and financial burden of healthcare could also be reduced.

4 METHODOLOGY/TECHNIQUE

Saffron stigmas were tested for their effect on atherosclerosis by using human coronary artery endothelial cell (HCAEC). The significant amount to cause the atherosclerotic changes were determined. Crude saffron was later formulated as a juice in 250 ml amount which contain significant amount of saffron that has been proven in vitro study to cause significant effect in reducing atherosclerosis. Market survey on saffron juice prototype was done to 200 random people through online survey to get respondent feedback on the interest to buy the product.

5 RESULT

Saffron downregulates gene and protein expressions of inflammation, endothelial activation and upregulate the gene of oxidative stress and inhibit monocyte- endothelial interaction which are the key events in pathogenesis of atherosclerosis (Table 1). 250 ml Saff-Chol Juice prototype is produced with completed packaging bottle (see Fig 1). Market survey showed 89.0 % of respondents would be interested to buy the product (see Fig 2).

Table 1. Effect of Saffron on various atherosclerosis markers.

Atherosclerosis Marker	Minimum Saffron concentration (ug/mL) that cause significant changes of atherosclerosis marker	p-value
eNOS	25	< 0.05
DCFHDA	31.3	< 0.01
IL-6 protein expression	3.1	<0.05
IL-8 protein expression	25	<0.05
IL-6 gene expression	25	< 0.01
IL-8 gene expression	-	-
NF-κB p50 protein expression	25	<0.01
NF-κB p65 protein expression	25	<0.05
NF-κB p50 gene expression	12.5	<0.05
NF-κB p65 gene expression	25	<0.05
sICAM-1 protein expression	3.13	<0.01
sVCAM-1 protein expression	3.13	<0.05
E-selectin protein expression	12.5	<0.01
sICAM-1 gene expression	12.5	<0.05
sVCAM-1 gene expression	3.13	<0.05
E-selectin gene expression	6.25	<0.05

eNOS: endothelial nitric oxide synthase; DCFHDA: 2',7'-Dichlorofluorescein diacetate, IL: interleukin; NF-κB: nuclear factor-kappa beta, sICAM-1: soluble intercellular adhesion molecule-1, sVCAM-1: soluble vascular cell adhesion molecule-1.



Fig. 1 Poster of Saff-Chol Juice

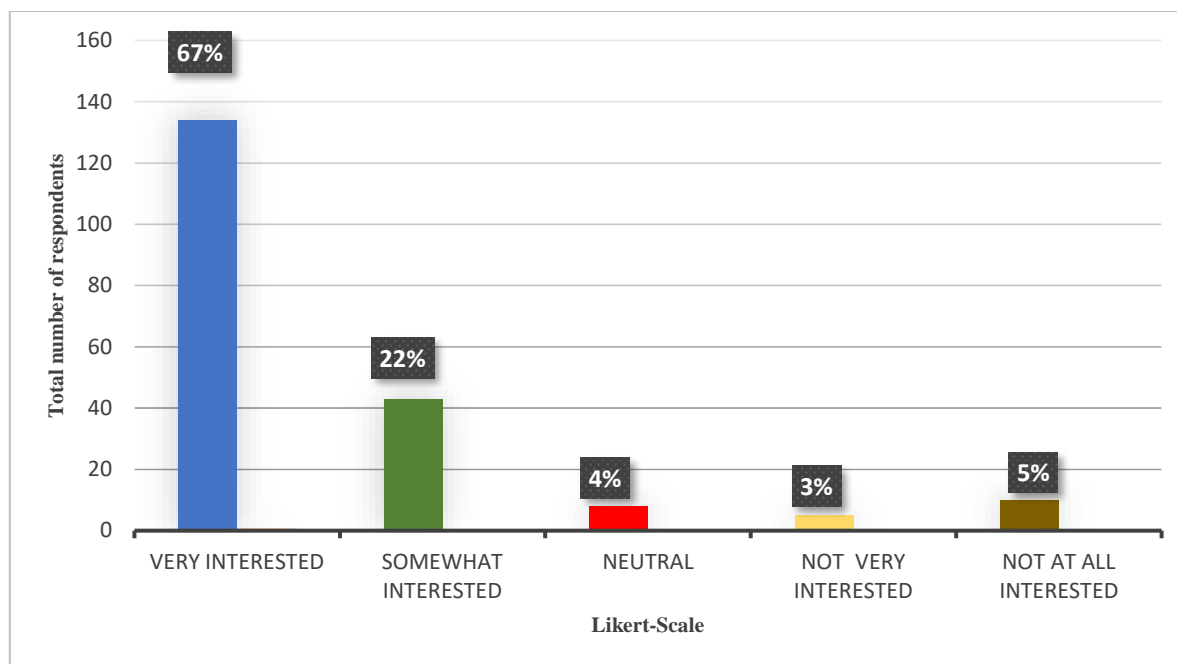


Fig. 2 Market survey showing the percentage and total number of respondents that interested to buy Saff-Chol Juice.

6 CONCLUSION

Saff-Chol juice could be used as natural supplement to reduce atherosclerosis. Further testing of Saffron on animal study and randomised control trial would be beneficial to improve the formulation of Saff-Chol juice.

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